

ABSTRACT

In one aspect the invention provides a method for laser induced breakdown of a material with a pulsed laser beam where the material is characterized by a relationship of fluence breakdown threshold (F_{th}) versus laser beam pulse width (T) that exhibits an abrupt, rapid, and distinct change or at least a clearly detectable and distinct change in slope at a predetermined laser pulse width value. The method comprises generating a beam of laser pulses in which each pulse has a pulse width equal to or less than the predetermined laser pulse width value. The beam is focused to a point at or beneath the surface of a material where laser induced breakdown is desired.

The beam may be used in combination with a mask in the beam path. The beam or mask may be moved in the x, y, and Z directions to produce desired features. The technique can produce features smaller than the spot size and Rayleigh range due to enhanced damage threshold accuracy in the short pulse regime.

TOP SECRET